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(54) Grinding of card clothing and card cylinders

(57) In a machine for grinding card clothing or card cylinders which can be attached to the cylinder by means of brackets 12 and where a grinding device mounted on a carriage 13 traverses parallel to the axis of the cylinder, grinding is performed not by a grinding wheel but by an endless abrasive belt 20 mounted on a pair of pulleys on the carriage. This enables efficient and accurate grinding, and at the same time allows easy replacement of the belt.

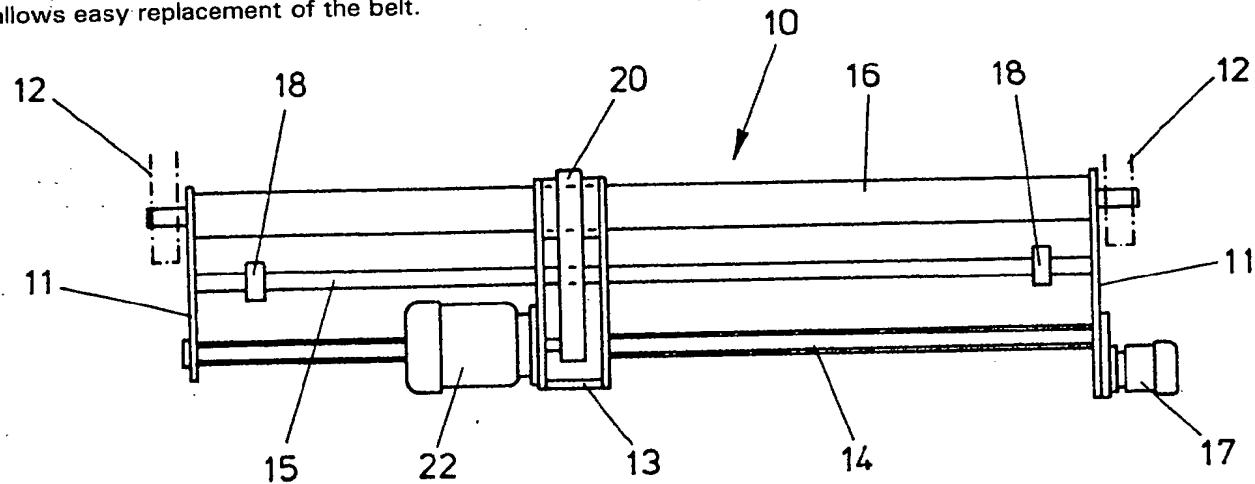


FIG. 1

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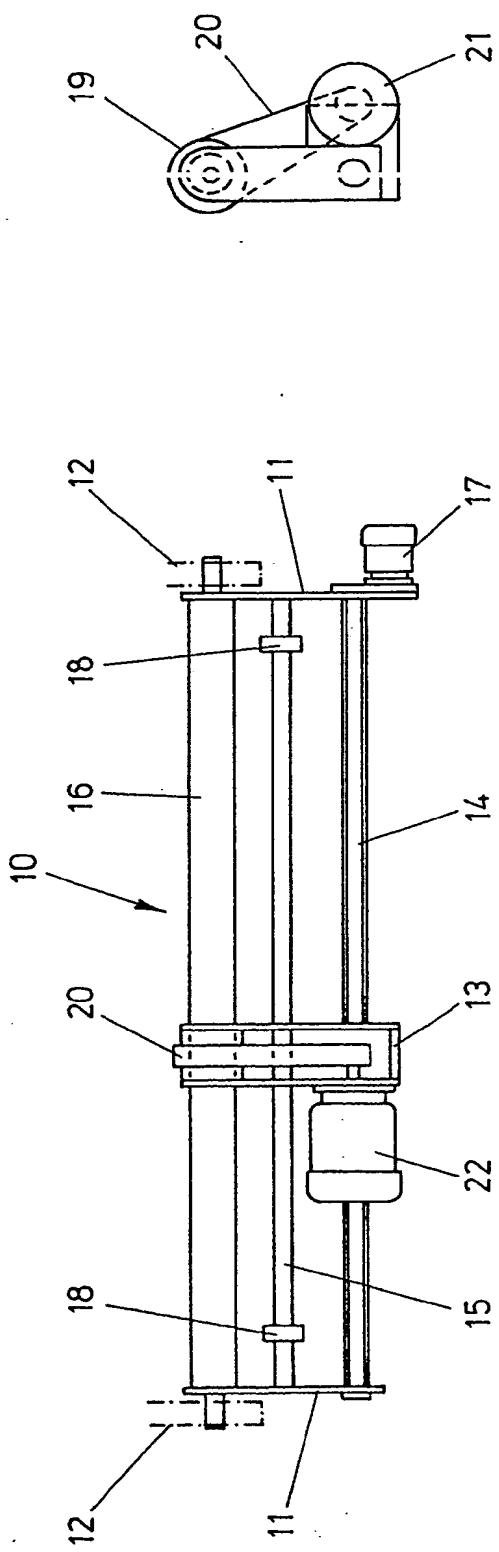


FIG. 2

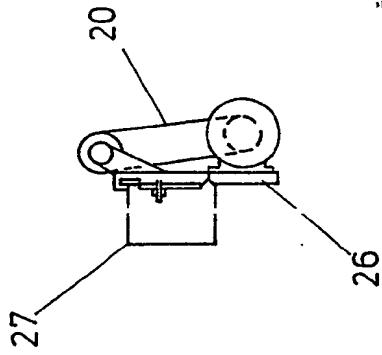


FIG. 4

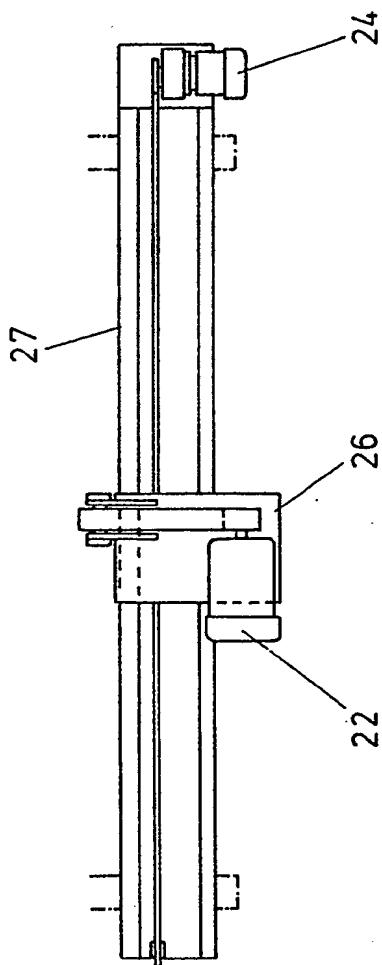


FIG. 3

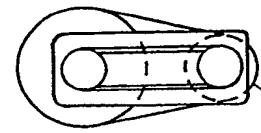


FIG. 6

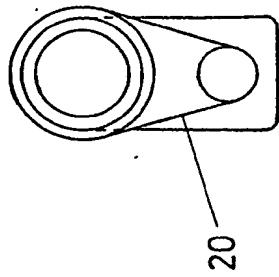


FIG. 8

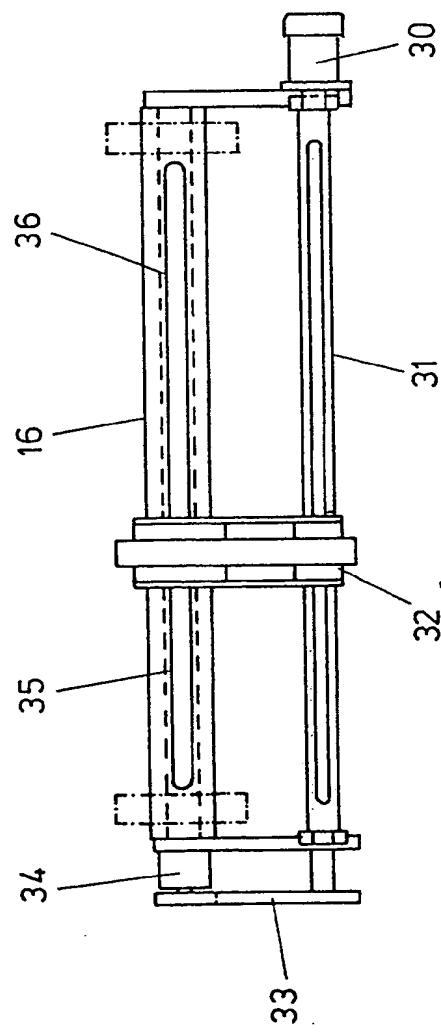


FIG. 5

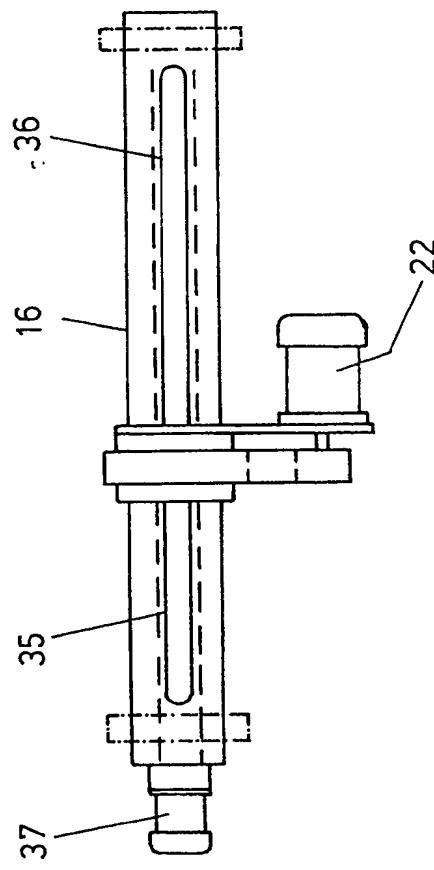


FIG. 7

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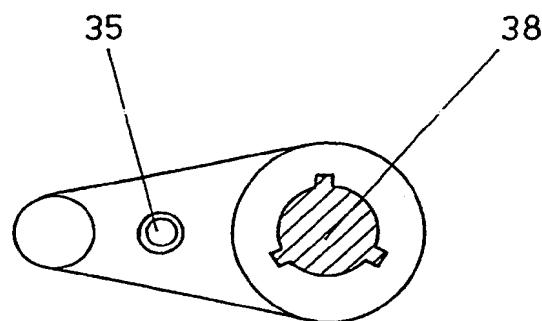


FIG. 9

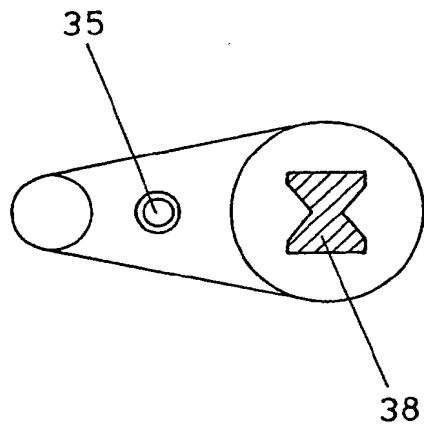


FIG. 10

SPECIFICATION

* Grinding of card clothing and card cylinders

5 This invention relates to the grinding of card clothing on card cylinders, and also to the grinding of unclothed cylinders or rollers.

It is known to use portable grinding machines in mills in order to surface grind both 10 metallic card clothing and also flexible card clothing while *in situ* on card cylinders and rollers. This is necessary in order to restore the sharp points on the teeth of the card clothing, and to maintain accuracy.

15 Less frequently, grinding machines are used to regrind the unclothed cast iron or steel rollers when they become out of true, usually due to mis-use.

Traditionally, the most popular type of 20 grinder has been the Traverse Wheel Grinder (120M(APPI)), but a disadvantage of this type of machine has been that grinding speeds are limited by the traverse mechanism used to traverse the wheel grinder, and due to the fact 25 that the wheel is mounted on a tube which revolves. Also, this machine is not suitable for grinding unclothed rollers.

Further, on conventional portable grinding 30 machines, wheel changing is a time consuming and laborious task which should only be carried out by suitably qualified personnel. This involves mounting the wheel, balancing and diamond dressing. Due to this, very often unsuitable wheels are used, or the diamond 35 dressing operation neglected, all to the detriment of the card clothing which is being re-ground.

There is also known a SM series machine 40 made by Peter Wolters, which seeks to overcome the disadvantages of the 120M machine described above, and in which the tube is stationary and the grinding wheel revolves around the stationary tube.

A different type of known machine is marketed by Howard Brothers (and shown in U.S. 45 Patent 3,537,831), and has an endless abrasive belt which runs in a generally horizontal plane, being mounted on a flat platen and being taken around three vertical axes pulleys. A 50 pair of the pulleys are mounted one at each end of a carding cylinder, and the endless belt moves between these two pulleys (parallel to the axis of the carding cylinder) while engaging continuously with the outer periphery of 55 the carding cylinder.

The present invention is based on the use 60 of an endless abrasive belt for grinding card clothing *in situ* on a card cylinder or roller, and if required also for grinding unclothed cylinders or rollers, or rollers with a base wire of the type used for subsequent attachment of metallic card clothing, but in a different and technically advantageous way from that disclosed in U.S. Patent 3,537,831.

65 According to a first aspect of the invention

there is provided a machine for grinding card clothing and card cylinders, comprising means for mounting the machine on the carding apparatus adjacent to the card cylinder, a carriage which traverses back and forth parallel to the axis of the card cylinder, means for mounting and means for driving the carriage to carry out the traversing motion, a grinding head mounted on the carriage and rotating

70 about an axis parallel to that of the cylinder, an endless abrasive belt enclosing and engaging the grinding head, and a means for driving the belt so as to rotate the grinding head.

According to a second aspect of the invention 80 there is provided a grinding machine for grinding card clothing on a card cylinder of a carding apparatus and comprising means for mounting the machine on the carding apparatus adjacent to the card cylinder, a carriage on which a rotary grinding device is mounted, means mounting the carriage on the machine for traversing movement back and forth along an axis generally parallel to the axis of rotation of the card cylinder and between the axially 85 opposite ends of the card cylinder, and drive means coupled with the carriage and operable to impart reciprocatory traversing movement to the carriage:

in which the grinding device comprises a 90 grinding head which is rotatable about an axis generally parallel to the traversing axis of the carriage, an endless abrasive belt which is taken partly around and engages with the grinding head, and a driving device operable to move the abrasive belt along an endless path and to rotate the grinding head whereby, upon reciprocatory traversing movement of the carriage, the grinding head is able to carry out grinding of the surface of the card clothing through the intermediary of the endless abrasive belt as the latter engages with the grinding head.

By carrying out the grinding of the card clothing through the intermediary of the endless abrasive belt, which is taken partly 100 around a grinding head which rotates about an axis parallel to the traversing axis, and also to the rotary axis of the card cylinder, an efficient and accurate grinding operation can be 105 achieved, and without any overheating or overloading of the grinding capacity, of the endless belt, since any one surface portion of the latter only makes intermittent contact with the card clothing. Furthermore, by moving the 110 endless belt in a plane perpendicular to the axis of the card cylinder, a more effective sharpening action can be carried out on the tips of the teeth of the card clothing, as compared with the lateral sharpening action which 115 is carried out by the known endless belt which moves axially along the circumference of the card cylinder.

In addition, when it becomes necessary to 120 replace a worn belt, it is a quick and simple 125 operation to remove the worn belt and to in-

stall a replacement. This contrasts favourably with the known use of portable grinding machines having grinding wheels, in which wheel changing is a time consuming and laborious

5 task requiring skilled personnel.

Preferably, the drive means for reciprocating the carriage comprises a motor-driven traversing mechanism, which may take the form, for example, of a threaded rod driven through a

10 gearbox by an electric motor, and engaging with the carriage so as to impart linear motion to the carriage along the length of the threaded rod during rotation of the latter. Alternatively, the traversing mechanism may

15 comprise a chain or toothed belt. As a further alternative, the carriage may be movable along a bed having accurate guideways formed therein, the carriage being moved along the guideways by means of either a screw thread arrangement, a chain or a toothed belt mechanism.

Conveniently, the endless abrasive belt extends in a continuous loop around a pair of pulleys or wheels arranged one at each end of

25 the loop, in which one of these wheels comprises the grinding head referred to above. The grinding head may be arranged to be rotated by the engagement of the abrasive belt therewith, in which case the other wheel is

30 arranged to be driven by the driving device referred to above. The driving device may comprise a motor drive coupling which is coupled with the carriage so as to be movable bodily therewith during its traversing movement, and which is operated to impart the necessary motion to the endless abrasive belt around its path of travel during this traversing movement.

The grinding machine according to the invention, as defined above, together with one or more of its preferred aspects, may also be applicable in the surface grinding of unclothed cylinder or rollers, or rollers with a base wire of the type used for subsequent attachment of

45 metallic card clothing. The cards with which the grinding apparatus of the invention may be used are woollen, cotton, worsted, compact and semi-worsted cards.

Embodiments of grinding machines according to the invention will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:

50 Figures 1 and 2 show a side view and an end view respectively of a first embodiment of

55 a grinding machine according to the invention;

Figures 3 and 4 show similar views of a second embodiment;

Figures 5 and 6 show similar views of a third embodiment;

60 Figures 7 and 8 show similar views of a fourth embodiment, with alternative forms shown in Figures 9 and 10.

Referring now to Figures 1 and 2 of the drawings, there is shown a first embodiment

tion, which is designated generally by reference 10. The machine 10 has end frames 11 which are adapted to be suspended from grinding brackets 12 which are normally provided

70 on a carding machine for mounting of a grinding device thereon, so that the grinding apparatus 10 can be mounted adjacent to a card cylinder (not shown) having card clothing thereon which is to be reground. A carriage

75 13 is mounted on the machine 10 for traversing back and forth along an axis generally parallel to the axis of rotation of the card cylinder and between the axially opposite ends thereof. Thus, the carriage 13 is able to reciprocate

80 linearly along the axes of parallel elongate elements 14, 15 and 18 between the end frames 11. The element 14 takes the form of a threaded rod which is driven by a traversing motor 17 and which is coupled with the carriage

85 13 whereby, upon rotation of the rod 14, linear motion is imparted to the carriage 13. Limit stops 18 are provided near each end of element 15, and these are electrical switches which reverse the direction of rotation of the motor 17. The elongate element 16 comprises a tube which is stationary, and on which a grinding head (described in more detail below) is rotatably mounted via ball bearings.

90 95 The threaded rod 14 and the motor 17 constitute drive means coupled with the carriage 13 and operable to impart reciprocatory traversing movement to the carriage.

A rotary grinding device is mounted on the 100 carriage 13 and comprises a grinding head 19 in the form of a wheel, pulley or drum, and which is rotatable about an axis generally parallel to the traversing axis of the carriage 13, and also to the axis of rotation of the card

105 cylinder which it is to engage. An endless abrasive belt 20 is taken partly around and engages the grinding head 19, and is also looped around a drive wheel 21 which is driven by motor 22, whereby the motor 22

110 and wheel 21 constitute a driving device operable to move the abrasive belt 20 around an endless path and to rotate the grinding head 19. It will be noted that the motor 22 is coupled with the carriage 13 so as to move

115 therewith during the traversing movement of the carriage. Thus, upon reciprocatory traversing movement of the carriage 13, the grinding head 19 is able to carry out grinding of the surface of the card clothing through the intermediary of the endless abrasive belt as the latter engages the grinding head.

The brackets 12 provided on the carding apparatus are fitted with a screw adjustment for any necessary infeed.

120 125 A second embodiment of grinding machine is shown in Figures 3 and 4, which shows a bed type machine. This machine is adapted to be attached to the side frames of the carding apparatus, or fitted to a grinding frame. The carriage is in the form of a saddle 26 and it

and the grinding head traverse on guideways provided on an elongate element in the form of a bed 27, and are driven by a screw, chain or toothed belt mechanism. The saddle is fitted with a cross-slide for any necessary in-feed adjustment. The grinding device is fitted with a contact wheel, motor and abrasive belt, in generally similar manner to the previously described embodiments.

10 Figures 5 to 8 show embodiments where the traverse mechanism employs a screw 35 mounted in stationary tube 16.

In the embodiment of Figures 5 and 6 only one motor is used, which drives both the carriage and the traversing mechanism. The motor 30 drives a revolving shaft 31 which has a full-length keyway. A drive pulley 32 with a key is fitted to the shaft and traverses together with the carriage. The motor also provides the traverse motion by driving, through a chain or belt drive 33 and a gearbox 34 located at the other end of the shaft 31, an internal screw 35 inside stationary tube 16. The screw 35 has both a left-hand and a right-hand thread, so that the carriage reverses automatically at the ends of the tube 16. The tube has a slot 36 to accept the nut (not shown) of the screw reverse mechanism, which is fixed to the carriage.

30 In Figures 7 and 8 the carriage traverse is again performed by an internal screw 35, but a separate traverse motor 37 is used, and the revolving shaft is dispensed with. The carriage, with motor 22, traverses along the stationary tube 16 and is prevented from rotating by a key (not shown) which engages in the slot 36 in the tube.

Alternatives to the slotted tube are shown in Figures 9 and 10, where the carriage slides on an elongate element in the form of beam 38 of suitable cross-section to prevent rotation; linear bearings may be used to reduce friction. The traverse screw 35 runs parallel to the beam 38.

45 It has been found in tests with embodiments of the invention, during the grinding of both flexible card clothing and metallic card clothing, that substantial advantages can be achieved. Thus, by driving the abrasive belt 50 20 at a high speed of 1150 m/min, this gave particularly impressive results, namely a clean grinding action with little or no burrs on the points of the teeth of the card clothing, a facility for rapid metal removal rates, and 55 close control of surface finish by the selection of the type of belt.

In addition, during grinding of unclothed cylinders and rollers, or cylinders clothed with aluminium/steel or plastics base wire, there 60 was a facility for rapid metal removal rates, close control of surface finish by the selection of the type of belt, and elimination of "chatter marks". This is a problem frequently encountered when using conventional portable grinders.

Furthermore, in the case of the abrasive belts becoming worn, belt changing is a very quick and easy operation, requiring no balancing or dressing, and therefore more consistent results can be achieved.

CLAIMS

1. A machine for grinding card clothing and card cylinders, comprising means for mounting the machine on the carding apparatus adjacent to the card cylinder, a carriage which traverses back and forth parallel to the axis of the card cylinder, means for mounting and means for driving the carriage to carry out the traversing motion, a grinding head mounted on the carriage and rotating about an axis parallel to that of the cylinder, an endless abrasive belt enclosing and engaging the grinding head, and a means for driving the belt so as to rotate the grinding head.
2. A machine for grinding card clothing on a card cylinder of a carding apparatus and comprising means for mounting the machine on the carding apparatus adjacent to the card cylinder, a carriage on which a rotary grinding device is mounted, means mounting the carriage on the machine for traversing movement back and forth along an axis generally parallel to the axis of rotation of the card cylinder and between the axially opposite ends of the card cylinder, and drive means coupled with the carriage and operable to impart reciprocatory traversing movement to the carriage:
 - in which the grinding device comprises a grinding head which is rotatable about an axis generally parallel to the traversing axis of the carriage, an endless abrasive belt which is taken partly around and engages with the grinding head, and a driving device operable to move the abrasive belt along an endless path and to rotate the grinding head whereby, upon reciprocatory traversing movement of the carriage, the grinding head is able to carry out grinding of the surface of the card clothing through the intermediary of the endless abrasive belt as the latter engages with the grinding head.
 3. A machine according to claim 1 or claim 2, where the means for mounting the carriage consists of a first elongate element.
 4. A machine according to claim 3, where the elongate element is in the form of a bed, and the carriage is in the form of a saddle riding on this bed.
 5. A machine according to claim 3, where the elongate element is in the form of a slotted tube passing through the carriage, and the carriage has a key which projects into the slot to prevent the carriage rotating.
 6. A machine according to claim 3, having a second elongate element, both elongate elements passing through the carriage.
 7. A machine according to any preceding claim, where the carriage is traversed by means of a chain or belt driven by a motor.

8. A machine according to any of claims 3 to 6, where the carriage is traversed by means of a threaded rod driven by a motor and parallel to the first elongate element.

5 9. A machine according to claim 8, wherein the threaded rod is contained within the first elongate element.

10. A machine according to any preceding claim, where the abrasive belt is driven by a motor mounted on the carriage.

11. A machine according to claim 6, where the second elongate element is rotated by a motor and drives both the abrasive belt and, via a gearbox, the traversing mechanism.

15 12. A machine as claimed in claim 1 or claim 2 and as described in the accompanying drawings.

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